

Review of DNO Environmental Action Plans for the RII0-ED2 price control

CLIENT: Citizens Advice

DATE: 7 February, 2022



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1 Introduction

1.1 Overview

British Electricity Distribution Network Operators (DNOs) submitted their final business plans for the RIIO-ED2 price control period in December 2021. Their submission comes at a point in time where the net zero agenda is of central influence for business, including for DNOs. Government has published its Net Zero strategy, enshrining into law a target to reduce green-house gas emissions by 78% by 2035¹, and the Science Base Target Initiative (SBTi) has updated its guidance to require corporations seeking validation to commit to a 1.5°C target. DNOs will play a critical role in helping the country, communities and individual customers to transition to a decarbonised, net zero future. The networks are key to facilitating and enabling the transition to decarbonised heat and transport as well as supporting increased volumes of distributed renewable power generation.

As part of their ED2 plans, Ofgem requires that DNOs each publish an Environmental Action Plan (EAP). These define targets and action plans in relation to the environmental subjects addressed in this report. This report was commissioned by Citizens Advice, an organisation committed to protecting consumer interests and, within this context, to championing a transition to a decarbonised future that serves the interests of the British public. In support of this objective, this report aims to consider if the EAPs and related materials demonstrate that environmental impacts and issues linked to DNO activities, operations and equipment will be managed with sufficient rigour and ambition relative to Ofgem baseline requirements, best practice and one another.

This report sets out a high-level assessment of strengths and opportunities for improvement for each environmental topic referenced in Ofgem's *RIIO-ED2 Business Plan Guidance*, [Appendix 3 – *Environmental Action Plan, baseline expectations*], with improvement considerations aimed at addressing the root cause of observed shortfalls without being prescriptive about actions needed by individual DNOs.

While all environmental subjects referenced in Ofgem's baseline expectations were included in this review, most of the report focuses on carbon reduction in DNO operations. This is reflective of the content emphasis in the EAPs and related business plans.

¹ The overall requirement is to be net zero by 2050 (2045 in Scotland). Within this context, the Climate Change Committee's Sixth Carbon Budget requires a 78% reduction by 2035 relative to 1990 level.

1.2 Overall finding and common themes

In overview, the British public is largely² well served by the DNO EAPs. The plans indicate that DNOs have strategies and action plans to address all environmental subjects covered in Ofgem's baseline expectations and that these are largely underpinned by stakeholder engagement, whole system considerations and cost benefit analysis to ensure balanced value for customers. There are also opportunities for improvement in specific subject areas. These are outlined together with strengths in the main body of this report, but the following general themes characterise the more detailed findings:

SHORTFALL THEMES

- **Disparity in rigour³ and ambition**
 - There is disparity in the rigour and ambition level between EAPs beyond the expected nuances driven by different topologies, stakeholder priorities/needs, customer demand, demographics and local district plans. Part of the cause may be the high-level nature of Ofgem expectations, which allow for interpretation of the rigour required to manage a subject or to report on it (some DNOs may have more rigorous strategies than they report). However, the root cause of the disparity may equally be due to one or more of the following factors frequently correlated with degree of excellence (but outside of this review's remit): executive management and board-level priorities, governance structures, dedicated roles that include both responsibility and authority, resource allocation (financial and expertise) and culture.
- **Performance is difficult to compare between DNOs and over time for any single DNO**
 - Target and performance metrics per topic are not standardised across environmental subjects, which makes it difficult to compare performance between DNOs and to assess the relative maturity and quality in managing a given subject. Additionally, not all metrics are given in a context that allows for meaningful measure of the quality and maturity of a DNO's performance in an environmental subject area over time and relative to other DNOs. For example, reporting reduction relative to a baseline (e.g., biodiversity units) or standardization of losses in net zero targets.
 - The length combined with variety of formats of EAPs, business plans and annual environmental reports makes accessing and comparing information time consuming and challenging.

IMPROVEMENT OPPORTUNITY THEMES

- **Reduce ambiguity in Ofgem expectations**
 - The business plan guidance and baseline expectations are understandably high-level at this stage. However, Ofgem's review of the Environmental Action Plans and associated material should create a better understanding of what is possible from the DNOs as a basis for being more specific in draft determinations about the baseline expectations. In creating more specific or prescriptive expectations, it is critical not to limit ambition, but rather to create minimum expectations. Less ambiguous Ofgem expectations, as detailed in relevant sections of this report, would help drive more congruent rigour and transparency, as well as performance comparability between DNOs.

² "Largely" is qualified by the areas for improvement identified in this report.

³ "Rigour" is used to refer to content thoroughness and detail.

- **Drive standardisation in metrics and report formats to assist comparability**
 - To address the comparability challenge and help readers rapidly navigate to salient data and information it would be valuable if Ofgem: 1) presented comparative information in its draft determination and 2) expected a form of standardisation in metrics and presentation of metrics in its upcoming guidance for Annual Environment Reporting. For example, providing a summary table at the front of annual Environmental Reports with ED1/2 targets and actual performance over a rolling 7-year period, supported by graphs and summaries by subject area would help address this impediment to information accessibility. The valuable detailed narrative to support each topic area could follow this more standardised summary.
- **Collaboration is key to accelerate the scope and pace of change and to improve comparability, benchmarking and innovation**
 - As demonstrated by several sector-based sustainability alliances (electronics, utilities, pharmaceuticals, aerospace, automotive, consumer goods, apparel and footwear), change is accelerated both within an organisation and its supplier network if knowledge regarding best practices, technologies and innovations is shared. This effect is amplified when best practices are used as the basis for developing a leading metrics index against which organisations can benchmark their maturity relative to best practice and their peers. Additionally, joint efforts and processes deliver this value at less effort and cost for individual organisations and, notably, their customers. As demonstrated by the US-based Electric Utility Industry Sustainability Alliance (EUISSCA.org), the benefits of collaboration can be achieved without contravening anti-trust regulations. Finally, given some overlap in processes and suppliers, these efforts may be further amplified by including transmission and gas system operators.
- **Incentivize collaboration and eliminate impediments to collaboration**
 - Given the urgency for progress, collaboration that accelerates environmental solutions, especially towards Net Zero, should be actively incentivised. For example, a funding pot in ED2 for collaborative activities on decarbonisation and the environment (building in consumer value assurance). On the corollary, it is critical to avoid financial incentives that inhibit information sharing between DNOs in relation to environmental management. Such mechanisms risk undermining the wide and accelerated knowledge sharing needed to support a more rapid transition to net zero and excellence across all environmental areas in a manner that serves the British public.

2 Business Carbon Footprint (BCF)

2.1 Ofgem expectations

Ofgem's baseline requirement

Adopt a science-based target for the company to reduce its scope 1 and 2 BCF by 20xx**, without relying on international GHG offsetting, that is in line with Net Zero.*

- *Commit to efficient and economic actions to reduce controllable BCF in RIIO-ED2.*
- *Identify metrics, and associated targets, for RIIO-ED2 to track the impact of implementing actions and the overall progress towards the science-based target and Net Zero.*
- *Commit to reporting on BCF reduction and progress towards science-based target and Net Zero using a common BCF methodology. Reporting should include progress in reducing scope 3 emissions***.*

* This should be verified by the science-based target initiative (SBTi): <https://sciencebasedtargets.org/>

** 20XX denotes that companies will need to specify a long-term date to achieve the specified target. We would then expect companies to specify the associated RIIO-ED2 milestone.

*** Scope 3 emissions are a consequence of actions which occur at sources which the DNO does not own or control and which are not classed as Scope 2 emissions. Although a DNO's science-based target does not include scope 3 emissions, DNOs' reporting should include progress against reducing scope 3 emissions.

2.2 DNO plans relative to expectations

DNOs have either committed to setting Science Based Targets (SBTs) aligned to governmental Net Zero expectations, have developed SBTs with help from third party subject matter experts, are in process of having them verified by the Science Based Target Initiative, or have already done so (e.g., UKPN was the first DNO to achieve a validated SBT⁴ and SSEN the first to have achieved validation of 1.5°C targets).

DNOs have stated commitments to achieve Net Zero before the government's 2050 requirement with interim target dates, some aligned to 2028, the end of the ED2 period. Not all are explicitly aligned with the Climate Change Committee's 6th Carbon Budget 2035 78% reduction targets; however, assuming a decarbonised power system by 2035 (a commitment within the UK government's Net Zero Strategy), this target should be met.

Albeit with variations in pace, actions to reduce their carbon footprints are, for the most part, common across DNOs. These include:

- Transitioning to renewable energy to supply own electricity needs.
- Fleet electrification where technically available.
- Generator modernisation (lower carbon fuels or hybrid models where possible).
- Building energy efficiency improvements.

⁴ UKPN notes that SBTi requirements have been updated and that newly submitted plans must align with a 1.5°C trajectory. They have signed the Business Ambition for the 1.5°C Campaign, which commits them to re-verify our Science Based Target at 1.5°C, which they pledge to do ahead of the current re-verification cycle in 2026. This will also require them to move to the new verified Net Zero Standard

- Substation energy efficiency improvements.
- SF6 reduction (see dedicated section below).
- Supply chain i.e. engaging with suppliers to drive down carbon in their own value chains (see dedicated section below).
- Reducing the carbon represented by the services, equipment and materials they use i.e. embodied carbon (see dedicated section below).

2.3 Improvement opportunities

- **Standardise metrics to improve transparency and comparability**

The most salient variation is between DNOs who include, versus those who don't include, losses in their Scope 2 targets and performance reporting. Those who include losses (e.g., SSEN, UKPN) risk looking less ambitious where the opposite may be true. Another key difference may be the degree to which a DNO is relying on offsets, which is not routinely made visible.

There are other variations in DNO targets and deadlines that, at face value, seem to represent different levels of ambition but which, upon closer consideration, are reasonable and defensible. Building energy efficiency retrofitting and fleet electrification provide good examples that apply uniformly across DNOs. By way of example, different rates of transition to fleet electrification may be matched to an organisation's vehicle replacement cycle and stakeholder ambition. Or, a higher target for fleet EV transition or for improving building energy efficiency represent a DNO "playing catch up" to peers who may have been making more incremental changes evenly over time, rather than a higher level of ambition. There are also issues that may be unique to any single DNO or licence area, but equally defensible as determinants of a lower face-value ambition. Historical structural necessities, for example, may slow the pace of BCF decarbonisation (e.g., SSEN has more diesel generators in place than other DNOs as a function of making sure island communities in the north of Scotland don't suffer blackouts if subsea connectors fail).

Improvement considerations:

- Present BCF targets and performance over time with and without losses. Validated science-based targets must conform to the Greenhouse Gas Protocol, which requires DNOs to include emissions associated with network losses. Standardising both target and performance reporting with and without losses improves parity and comparability between DNOs in this priority performance area.
- Work toward including Scope 3 emissions in carbon footprint targets and reporting using a common methodology agreed by DNOs. While not required under the rules of the SBTi, scope 3 emissions can account for a significant proportion of a DNO's carbon footprint excluding losses e.g., "84% of our carbon footprint (excluding losses) and 24% with losses included" to quote one DNO. This also provides visibility into the efficacy of efforts being made to address this material impact in network.
- Create standardised metrics for reporting other BCF elements and standardised formats for reporting performance summaries that allow for easy comparison between DNO performance and evaluation of individual DNO performance over time (refer to improvement considerations specified for "common themes" in the Introduction section).

- **Drive comparable rigour between strategies and action plans**

In addition to the core actions referenced above, some DNOs include a broader scope of actions in their BCF action plans. For example, employee engagement, awareness raising and training to help them to be agents of change for sustainability at work and at home (e.g., ENW, UKPN), improving the fuel efficiency of existing fleet (e.g., driver behaviour, telematics, switching to lower carbon fuels where possible, vehicle maintenance programmes).

Improvement consideration:

- Via a collaborative effort between UK DNOs, develop an aggregated list of BCF reduction practices for (technology, engineering and administrative activities) for DNOs to consider as part of continuous improvement efforts. Consider ranking them by environmental value, operational/maintenance benefits, financial benefits (total cost of ownership/ whole life cost) and implementation ease.

3 Losses

3.1 Ofgem Expectations

EAP baseline requirement

Develop and commit to implementing a strategy to efficiently manage both technical and non-technical losses on the DNO's network over the long term. This should include specific actions and performance measures to track the impact of actions in RIIO-ED2.

- *Commit to reporting on the progress of implementing the losses strategy and associated performance measures.*
- *Contribute to the evidence base on the proportion of losses that network companies can influence/control.*

ED2 Methodology Decision

Standard Licence Condition 49 of the Electricity Distribution Licence, which requires DNOs to manage losses to as low as reasonably practicable on their distribution network. In doing so, DNOs are required to act in accordance with their published Distribution Losses Strategy.

3.2 DNO plans relative to expectations

DNO plans acknowledge reduction of losses as an important issue in the context of the dominance in their carbon footprint (some estimated just north of 90%) and corresponding indications from stakeholders that losses are a priority issue. Plans generally articulate that there are network variables, which DNOs can influence over time without incurring unacceptable cost (e.g., replacing equipment at the end of life with lower loss equipment, managing power quality). They also emphasise that:

- Losses are largely driven by customer demand for electricity, which is mostly outside of their control (see correlating improvement opportunity below).
- Losses will grow as a function of the increased demand driven by the electrification of heat and transport in line with achieving the government's target of Net Zero by 2050.
- The carbon footprint represented by losses will be eliminated as power generation decarbonises (see correlating improvement opportunity below).

Notwithstanding the above points, and in line with licence expectations, there is a commitment to continue to take actions to address losses to levels that are "as low as reasonably practicable" (as per Ofgem's Licence expectation), together with descriptions of actions taken and planned for the ED2 period. These include a set of core activities common across the DNOs, which focus on replacing equipment, influencing the demand for electricity, power factors and power quality; namely:

- **Transformers:** Targeting high loss transformers for earlier replacement; installing low loss transformers for new installations or for end-of-life transformers; sizing of transformers with larger capacity than technically needed.
- **Substations:** Energy efficiency retrofitting for existing substations and energy efficient engineering and design for new substations.

- **Cables:** Increasing cable size in low and high voltage applications; installing cables comprised of lower loss material (e.g., Aluminium Conductor Composite Core (ACCC)) for all new or updated installations.
- **Power factor:** Power factor correction; power factor quality improvement.
- **Demand response programmes:** Using pricing incentives to drive voluntary electricity consumption reduction by consumers during peak periods

DNOs use a standard methodology to estimate line losses with some DNOs articulating plans to gain more accurate measurements in ED2 of losses specific to their networks to better inform how to manage some of the losses. All DNOs have either already integrated, or report being in the process of integrating, loss considerations into applicable investment decision-making using Ofgem’s Cost Benefit Analysis methodology and encapsulated in the Common Evaluation Methodology tool (often customizing these for equipment category to increase the methodology accuracy). There is also collaboration within the Energy Networks Association framework or between individual DNOs to continue to improve the understanding of proportion of losses that network companies can influence/control.

3.3 Improvement Opportunities

Irrespective of DNOs having met the letter of Ofgem’s EAP and licence baseline expectations, there is variation in the spirit of ownership of losses and in the rigour with which they appear to be addressed, measured and/or presented.

- **Include losses in targets and performance metrics**

Some DNOs place great emphasise on the lack of control DNOs have on loss reduction and/or emphasise that carbon represented by losses will no longer be an issue once the grid decarbonises. Others adopt greater narrative responsibility (e.g., SSEN) for driving down losses than others, referencing the critical point that losses increase the power generation and general system capacity needed to deliver a unit of electricity to the end user. This is not only associated with an environmental cost but also with the financial cost required to build and maintain the extra capacity (ultimately, carried by the customer). A minority of DNOs demonstrate this ownership or the higher degree of transparency and rigour associated with including losses in their carbon reduction targets (e.g., UKPN, SSEN) despite that at face-value they may look less ambitious relative to other DNOs.

Improvement consideration:

- Standardise the inclusion of losses in targets and performance metrics (see “Business Carbon Footprint” above).

- **Drive comparable rigour between strategies and action plans**

There is variation in the rigour between DNOs of their documented loss strategies and action plans with some plans restricted, more or less, to the core actions referenced above, while others present a thorough and highly accessible loss strategy with clear tabulation of value-ranked loss reduction actions considered and transparent logic for grouping actions prioritized by High, Medium and Low (e.g., SPEN, NPg). This is followed by a detailed description of each action and value should one wish to access more detail (also evidenced in SSEN’s plan).

The action plans also reveal that some DNOs appear to be implementing or considering more and varied actions than those listed as “core” above. For example, equipment related considerations like on-load tap changing (e.g., SSEN, ENW), initiatives to reduce theft and other non-technical

losses (e.g., SSEN's "Network Protection Team" and "Unmetered Supplies Team" efforts), and campaigns to drive customer flexibility and efficiency (e.g., UKPN, NPG). The latter is especially important given that customer demand is a key driver of losses.

Improvement considerations:

- Via a collaborative effort between UK DNOs and subject matter experts (including but not limited to other DNOs globally, suppliers, academic institutions), develop an aggregated list of loss reduction best practices (technology, engineering and administrative activities) ranked by loss reduction value, operational/maintenance benefits, financial benefits (total cost of ownership/whole life cost) and implementation ease. Use the list as a set of leading measures against which DNOs assess and benchmark themselves.
 - Metric 1: DNOs specify which best practices they have implemented and across what applicable scope of their operations⁵.
 - Metric 2: Loss reduction per annum, or more meaningful period, (using standardised method) as a way of calibrating losses in percentage terms relative to peers and the leading measures (that also take cognisance of systemically driven differences in losses that are beyond a DNO's control e.g., network topology).

Rationale: The nature of the wording in the EAP baseline and licence expectations allows for range of rigour and pace in how DNOs manage down losses in their networks. The above creates visibility into the actions that underlie what as "low as reasonably practicable" equates to, a way to assess rigour and pace relative to available best practices and allows for greater comparability between DNOs. Additionally, the type of comparability afforded via such a mechanism is also the only equitable way to include performance on losses in an Environmental Scorecard financial incentive mechanism (however, see related point in the Introduction in section "Eliminate Impediments to Collaboration").

- Given the vital role of customer demand in impacting losses (doubling the current flowing through a network increase the losses by a factor of four), there may be value in creating a formal expectation that DNOs and other organisations that have relevant customer interface drive customer awareness of the value of energy efficiency (environmental and financial savings) and how to achieve it. Reference is made in the ED2 business plans and some EAPs to demand reduction programmes and time-of-use tariffs to reduce demand at peak use periods; however, there is little focus on broader customer energy efficiency measures as a key measure to reduce losses.

Improvement consideration:

- Report loss reduction forecasts and figures in context to make loss reduction estimates and total network losses more comparable (e.g., of electricity transmitted, cable miles and substation number), while acknowledging the inherent variations caused by different network topology, demand, etc.

Specify methodology and carbon values

Not all plans specify loss measurement methodology deployed or the carbon values used in these methodologies.

⁵ Any tool should also allow for DNOs to register 'Not Applicable' or the challenges they face to implementing best practices due to defensible differences. For example, topology, rate of regional decarbonisation, stakeholder priorities, historical structural differences e.g., SSEN has had to rely to a greater extent on diesel generators to ensure electricity supply continuity to island populations when subsea cables fail.

Improvement considerations:

- *Carbon values:* All loss assessment methodologies should incorporate the latest carbon values issued by BEIS (common DNO methodologies and DNO-customized Cost Benefit Analysis tools).
- *Common methodology:* Update work of ENA Technical Losses Group to confirm or define the agreed industry measurement methodology (articulating where there are common methods/similarities and where differences need to be applied per DNO). Last update was in October 2019.
- *Record-keeping:* Consider requesting that DNOs keep/make records available at short notice to demonstration for random audit purposes that losses are included in all investment and project decisions that impact losses.

4 Sulphur Hexafluoride (SF₆)

4.1 Ofgem Expectations

EAP baseline requirement

- *Commit to implementing a strategy in RIIO-ED2 to manage SF₆ on their network. This should include economic and efficient actions to reduce leakage rates and where appropriate, economic and efficient SF₆ asset replacement.*
- *Adopt a target for SF₆ leakage reduction.*
- *Commit to reporting on total SF₆ bank and leakage reduction rates using a common DNO methodology.*

4.2 DNO plans relative to expectations

DNOs all prioritise SF₆ reduction, aligned with stakeholder concerns, with electric utilities being responsible for roughly 80% of SF₆ use globally, and with the carbon warming potential of the gas (one molecule of SF₆ has roughly 23,000 times the global warming potential of a CO₂ molecule, and persists in the atmosphere for approximately 3000 years compared to CO₂'s 100-300 years). All DNOs articulate leakage reduction targets and are reporting their total SF₆ bank and leak reduction volumes or percentages. Reported SF₆ reduction activities are, more or less, common across DNOs. Typical practices include:

- Replacing equipment with high leak rates (DNOs have their own thresholds of what defines “high”).
- Leak repair: Improving leak monitoring and detection (e.g., using thermal imaging camera technology to pinpoint and target leaks on the network), and more rapid leak repair.
- Improving SF₆ handling procedures (top ups and removals) to reducing leaks that occur during handling.
- Installing SF₆ -free equipment where alternatives are available.
- Working with equipment manufacturers to help develop and advance acceptable alternative solutions at lower voltages.

Most DNOs report that more rapid advancement in SF₆ reduction is impeded by the lack of commercially available alternative technology at lower voltages. Also that there is a higher cost of alternatives and that the long duration needed to test performance of new technologies for their applications and circumstances limits options. These positions are reasonable to a degree, but appear less defensible in light of the fact that some DNOs are more active in testing alternative technology prior to its commercialisation, in rolling out commercially available alternative and in pro-active engagement with manufacturers and cross industry stakeholders to accelerate the development and commercialisation of alternatives to SF₆ (e.g., SSEN)⁶.

⁶ An update to the EU F-Gas legislation is expected in Spring 2022 and proposed legislation to cover Great Britain is expected in Spring 2023 and to be enacted in 2024, which may drive an accelerated path for migration away from SF₆.

4.3 Improvement Opportunities

- **Consider establishing an industry leak rate maximum**

Consider a stakeholder-led initiative (e.g., DEFRA, DNOs, independent subject matter experts, ENA) to determine if establishing a maximum industry leak rate would be an effective and reasonable way to drive down leak rates and the overall SF₆ bank, similar to that in place for integrated utilities in California as regulated by the California Air Resource Board. To inform considerations, include a benchmark study of countries/utilities operating in similar environments to the UK DNOs to identify those with the lowest leak rates and to determine best practices and technology alternatives tested for UK applications and conditions. This, to support or augment ENA's work to document SF₆ alternatives, their applicability, effectiveness and payback for UK applications and conditions.

- **Drive more even rigour between strategies and action plans**

Similar to the improvement considerations for the section on losses, develop a leading measures index relative to best practices (technology, maintenance, engineering, handling practices) to correlate with leak rates reported. This would drive greater visibility into what "economic and efficient actions to reduce leakage rates" and for "SF₆ asset replacement" are (to quote baseline expectations) and provide a more meaningful gauge of the relative maturity and quality of SF₆ reduction strategies.

- **Industry collaboration to accelerate the development of alternatives**

As one DNO notes, "change will not happen unless we all push for it" and as demonstrated by US-based utility alliance, the Electric Utility Industry Supply Chain Sustainability Alliance (EUISSCA), utilities can collaborate without transgressing anti-trust laws to create a greater market signal and clearer development roadmap for equipment manufacturers that helps accelerate the design and commercialisation of SF₆ alternatives at lower cost. Agreeing to test new technology on their networks also helps to accelerate technology track to market.

5 Supply Chain

5.1 Ofgem expectations

EAP baseline requirement:

- *Adopt high standards of environmental management in supplier code, including requirements for public disclosure of metrics and cascading code to their suppliers that are material to company's inputs.*
- *Adopt target of more than 80% of suppliers (by value) meeting code in RIIO-ED2.*
- *Commit to reporting on actual percentage of suppliers (by value) meeting code.*

5.2 DNO plans relative to expectations

All DNOs commit to meeting Ofgem expectations within ED2 with some DNOs reporting important early initiatives in supply chain and supplier management. Examples include, tracking contractor carbon emissions (e.g., NPG, WPD, SPEN) and mapping carbon hotspots in procurement categories (e.g., UKPN, SSEN, NPG) (also linked to embodied carbon discussed in section 6). In terms of commitments made, best practice examples are demonstrated by UKPN (included scope 3 emissions their official SBTi approved targets) and SSEN (aim to have 35% of their supply chain set a verified SBT by 2026 to reduce their embodied carbon).

Because supply chain sustainability is in the early stages of development across the DNOs, the primary content for comparison are commitments reported in the EAPs rather than historical performance. These commitments are wide-ranging in scope and ambition with the following select examples of good basic practice and some best practice:

Good practice

- Annual supplier reporting on emissions.
- Incorporation of environmental measures into supplier selection and performance review of incumbent suppliers.
- Supplier engagement and capability development, including but beyond carbon reduction to include comprehensive sustainability topics.
- Capability development for DNO procurement and supply chain staff.
- Exploring options for end-of-life in reusing, redesigning or repurposing materials for a circular/semi-circular economy.

Best practice

- Beyond 80% of suppliers (based on contract value) to conform to supplier codes.
- Incentive mechanisms to drive a reduction in carbon/environmental impact.
- Applying targeted supply chain mapping to reduce unnecessary journeys across tier 2 and 3 suppliers.
- Measuring embodied carbon for materials, construction and works/services delivery (discussed further in section below on Embodied Carbon).

5.3 Improvement opportunities

- **Incorporate social responsibility expectations**

To align with industry norms and stakeholder expectations, consider broadening the scope of expectations to include social considerations. For example “Adopt high standards of environmental management and social responsibility in supplier code...”

- **Develop a joint industry Supplier Code of Conduct to address ambiguity in Ofgem expectations and reduce duplicative effort.**

Consider a DNO collaboration to develop a single supplier code of conduct and consider developing the code based upon international best practice (not limited to the utility industry). Creating a joint supplier code would have the following benefits:

- Ensure that all DNOs have the same interpretation of what “high standards” referred to in the Ofgem expectations means. The first two expectations to “Adopt target of more than 80% of suppliers (by value) meeting code in RIIO-ED2” and to “Commit to reporting on actual percentage of suppliers (by value) meeting code” are strong requirements. Their efficacy may, however, be undermined by the first commitment to “Adopt high standards of environmental management in supplier code”, which allows for interpretation both of sustainability subjects that are in scope and performance expectations relative to these subjects.
- Reduce duplicative effort among DNOs.
- Send a stronger/joint signal to the supplier community, many of which the DNOs have in common. Examples from multiple industry sectors, including the utility sector in the USA (EUISSCA), demonstrate that this ‘joint voice’ approach helps accelerate best practice adoption and performance improvement among supplier networks.
- Significantly reduce the effort that would otherwise be required by suppliers to demonstrate conformance to 6 different DNO codes.
- Form the basis for a potential single process (including considering platforms and tooling) to verify conformance to the code (at least for suppliers that DNOs have in common) on a risk-ranked basis (managed by a third party to avoid anti-trust issues). This would have the benefit of achieving the same value with reduced effort and cost, for DNOs, suppliers and customers.

To amplify the benefits listed above, a further consideration may be to broaden the collaboration to include electric transmission, power generation and gas distribution peers who may also utilise many of the same suppliers.

- **Industry collaboration to accelerate best practice sharing and innovation.**

Similar to improvement considerations raised in the sections above, industry collaboration is a strong vehicle through which DNOs could drive accelerated knowledge-sharing on best practices, technology and innovation specific to DNO procurement categories (equipment, services, products across business units), and in which to share and surface supplier innovations. EUISSCA provides a good example of the benefits of collaboration in this area, as do collaborations in several other sectors (e.g., electronics, pharmaceuticals, aerospace, automotive, consumer goods, apparel and footwear).

6 Embodied Carbon

6.1 Ofgem expectations

EAP baseline requirement:

- *Commit to monitoring and reporting on embodied carbon in new projects.*
- *Commit to collaborating with DNO's supply chain on addressing challenges to reduce embodied carbon in the network.*
- *Commit to establishing baseline and a target to reduce embodied carbon on new projects during RIIO-ED2.*

6.2 DNO plans relative to expectations

Some DNOs can point to examples of using lower carbon materials or design (e.g., lower carbon concrete, refurbished office furniture for retrofits, substation structure design, logistics optimization to reducing fuel embodied by a project, renewable energy to power projects), but momentum on this expectation is in its infancy and largely limited to DNOs committing to meeting Ofgem expectations during ED2, with some mentioning collaboration to develop a common methodology between DNOs.

6.3 Improvement opportunities

- **Consider phasing within the expectation to maximise efficiency and effectiveness**

Ofgem's baseline expectation has high value; however, a modification that focuses efforts on quick-win and/or high value carbon reduction activities and materials within the control of DNOs as a priority could serve as a practicable interim expectation (similar to the hot-spot mapping referred to in section 5.2). The complexity, time and resources required to conform to the current expectation in absolute terms is very significant, risks costing more than justified and may divert resources from other important supply chain-related initiatives.

- **Industry collaboration to accelerate best practice sharing and innovation.**

Given the significant effort in coordination and collaboration with suppliers (some overlapping) and similar cross-functional internal stakeholders groups within each DNO, this is another area in which DNO collaboration would be of high value to accelerate the adoption of best practice by aggregating and sharing knowledge. The sparse and disparate examples of practices mentioned across the EAPs emphasize this point, as does the absence of mention of other common practices and technology (although this may be a function of reporting at this stage, rather than practice/technologies not being in use at some or all DNOs). For example, inspection and maintenance programmes that prolong the life of assets and avoid costs, and materials with lower embodied carbon that have low switching cost (e.g., warm-mix asphalt, toughened glass insulators, sub-station LED lighting, pole hardware made with thermal diffusion galvanisation rather than hot-dip galvanisation).

Several DNOs mention the intention to develop methodologies, including joint methodologies, to measure project carbon baselines and performance improvement. In these processes, it may help short-cut efforts to reference or adapting existing carbon calculators (e.g., from water and highway sectors).

7 Resource Use & Waste

7.1 Ofgem expectations

EAP baseline requirement:

- *Adopt a target for:*
 - *Zero waste to landfill by 20XX.*
 - *Recycled and reused materials as a percentage of total materials by 20XX.*
- *Commit to reporting on actual waste to landfill, recycling and reuse as a percentage of total.*
- *Update procurement processes to embed Circular Economy principles.*

7.2 DNO plans relative to expectations

Circular design principles are mostly restricted to commitment level (either in this section or the section on Supply Chain). Regarding waste targets, all except one DNO appear to have adopted targets for zero waste to landfill by a specified date and most have waste diversion, reduction and/or recycling target for the ED2 period. The more credible zero-waste targets have deadlines between 2028 and 2035 and specify that targets exclude regulated or unavoidable wastes. The least defensible example of a zero-waste target is one dated to 2050, which seems to defer responsibility to a future workforce (unless this target includes regulated waste, in which case this should be specified).

7.3 Improvement opportunities

- **Eliminate ambiguity from expectations**

Minor wording edits in a couple of the Ofgem expectations could help eliminate what may be interpreted as ambiguity. Specifically, “Zero waste to landfill by 20XX” could be modified with “avoidable” or “regulated” (unless hazardous and other regulated waste is intended, in which case it would help to make that explicit). And “Recycled and reused materials as a percentage of total materials by 20XX” could be modified with “total waste materials” or “total materials disposed” (unless total direct and indirect materials purchased is intended).
- **Report metrics relative to a waste inventory**

Include an expectation that total waste volumes be based on a waste stream inventory that includes reporting waste volumes generated by source and disposed by fate (e.g., refurbished for reuse, recycled, disposed of as per regulations, including if waste is diverted to incineration for energy generation) on a rolling 7-year period. Waste stream examples include, but are by no means limited to office waste, excavation waste, metal conduit/cable waste, transformers to mention only a few, vehicle repair shop waste).
- **Consider incorporating circular economy principles in investment decision making and construction design**
- **Report successful waste avoidance measures**

To demonstrate waste avoidance measures to stakeholders, DNOs could consider reporting measures explored and deployed, together with their associated cost avoidance, savings or

revenue e.g., equipment refurbishment and related cost avoidance (wood poles, electrical equipment, etc.), recycling of end-of-life metal equipment.

- **Industry collaboration to accelerate best practice sharing and innovation.**

Consider forming an industry wide view of easily recyclable and hard to recycle materials and components. And consider commitments to either phase out or find end-of-life solutions for the hard to recycle components.

8 Oil Pollution

8.1 Ofgem expectation

EAP baseline requirement:

- *Adopt a target for reductions in the volume of fluid (oil) used to top up cables.*

8.2 DNO plans relative to expectations

Most DNOs report a common set of actions to reduce oil-filled cables, the primary of which is replacing lengths of leaking oil-filled cables over time. Some specify a target date for doing so. Other common practices referenced in plans include:

- Pro-active and effective leak detection (including via visual detection and tracing using a benign chemical, perfluorocarbon, injected into cables that allows rapid location of leaks).
- More rapid response times following leak detection with spot repair, draining and sealing of a leaking section of cable, or full cable replacement.

Fewer plans reference the following equally important elements:

- How cables are prioritised for replacement i.e., those with a history of high leak rates and those that risk impacting sensitive environmental receptors like groundwater sources or surface water (e.g., UKPN, WPD, SSEN).
- Map to illustrate location of the fluid-filled cables within the network (e.g., ENW).
- Innovations to repair cables without replacement; specifically, self-healing cable technology (at early trial stages) (e.g., UKPN).
- Oil reduction targets and performance relative to the total fluid filled cable oil bank, which also allows leak rate and leak rate improvement reporting (e.g., UKPN).

8.3 Improvement opportunities

- Specify how cable replacement is prioritised.
- Include targets and reductions relative to total fluid filled cable oil bank and leak rate.
- Collaborate between DNOs to share and accelerate adoption of best practices and innovative technology such as self-healing cable technology.

9 Biodiversity/natural capital

9.1 Ofgem expectation

EAP baseline requirement:

- *Adopt appropriate tool to assess net changes in natural capital from different options for new connections and network projects.*
- *Adopt appropriate tool to monitor the provision of ecosystem services from network sites and report annually.*

9.2 DNO plans relative to expectations

All DNOs make commitments that are aligned to the baseline expectations. The key difference among them is that some DNOs commit to identifying an appropriate tool during the ED2 period, while others have already identified and/or deployed one. For example, DEFRA's methodology (e.g., UKPN) or The Nature Tool (e.g., SPEN) to assess the impact of land-use management changes on natural capital and biodiversity.

Most DNOs have committed to achieving net gains in biodiversity at sites across their networks in line with stakeholders priorities and preferences and to working with local communities and third parties like Natural England to help guide and design strategy and action.

Similar to other subjects in this report, however, there is diversity in scope and rigour of the reported approaches to and performance reporting of biodiversity and natural capital (only a few report a form of quantified historical improvements e.g., UKPN) that suggests greater maturity and/or expertise (e.g., SPEN) on the subject matter among some DNOs. Examples of this include:

- Reporting some form of quantified historical improvements (e.g., UKPN).
- Describing how their vegetation management plans, which are required to maintain safe and reliable networks, are integrated with biodiversity management and protection of the native and veteran trees (e.g., SPEN).
- Tying biodiversity measures to net zero initiatives via local inseting or offsetting (e.g., reforestation and peat restoration (e.g., SSEN, SPEN).
- Using laser scanning technology that helps more rapidly identify tree species-types and build a biodiversity data bank to inform future investment decisions based on rate of tree growth and sequestration potential (SSEN).

9.3 Improvement opportunities

- Align Ofgem baseline expectations with legal obligations under the Environment Act e.g., that DNOs are able to demonstrate a net gain in biodiversity on all major infrastructure projects as per requirements of the Environment Act.

- Collaborate between DNOs to share best practice and agree upon acceptable tools that meet or exceed the rigour of DEFRA methodologies, including expressing targets in terms of biodiversity units, rather than limiting it to sites improved.
- Make projects clear relative to land area managed and eligible sites and projects, including but not limited to new connections and network projects.

10 Polychlorinated Biphenyl-related pollution (PCBs)

10.1 Ofgem expectation

EAP baseline requirement:

- *Commit to reporting on the volume of PCB-contaminated equipment on the network.*

10.2 DNO plans relative to expectations

DNOs are required by statute⁷ to remove or decontaminate all equipment containing PCBs over permitted levels (0.005%/0.05dm³) by December 31st, 2025. All report programmes that target replacement of PCB-contaminated assets, but only some report units on the networks as well as units replaced thus far (e.g. NPg). Some DNOs also emphasise the opportunity they are taking via this initiative to replace assets with equipment that supports lower technical losses as well as being PCB-free (e.g., WPD).

The greatest challenge in this initiative is pole-mounted transformers, which are sealed units and therefore testing them for PCBs is not currently possible. DNOs rely on statistical modelling using a common methodology to estimate the replacements, with WPD reporting innovation projects to research and develop in situ PCB testing. A few of the DNOs provide detailed explanation of their management programmes and processes for identifying, and safely managing and disposing of PCBs. ENW goes further than this and details their management of insulation oils in general, including detection and safe disposal of PCB-containing oil (at concentrations that go beyond regulatory requirements) and recycling of contaminant-free metal equipment.

10.3 Improvement opportunities

- While PCB elimination is driven by regulatory requirements, to meet Ofgem expectations DNO's should standardise reporting of PCB-containing equipment on the network as well as progress to removing it.

⁷ The Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances) (England and Wales) (Amendment) Regulations 2020 require all PCB-contaminated equipment to be disposed of or decontaminated of PCBs by 31 December 2025.

11 Noise

11.1 Ofgem expectation

EAP baseline requirement:

- *Commit to reporting on actions taken to reduce noise pollution.*

11.2 DNO plans relative to expectations

All DNOs meet the letter of the baseline requirement in terms of committing to reporting on actions taken to reduce noise pollution. Similar to other subject areas, however, there is a range in rigour and in accessible reports of historical performance. Some DNOs give detailed accounts of noise management and proactive measures planned (e.g., ENW, UKPN) and taken to reduce noise (e.g., UKPN), while for others reports of historical performance are challenging to locate.

In addition to the core action of recording, investigating and addressing complaints about noise, examples of good practice include:

- Vehicles: Limited vehicle idling, transition to electric vehicles (longer term).
- Equipment: Trialling the use of electric diggers (ENW).
- Generators: Migrating to quieter equipment and/or using sound barriers to temper the noise.
- Substations: Engineering in barriers, enclosures and acoustic dampening.
- Street works: Limiting working hours to daytime hours, deploying screens and sound barriers, transitioning to electric tools and machinery.

11.3 Improvement opportunities

- Report noise management actions: Report actions taken to reduce noise in annual environmental reports, or make existing data and information easier to locate.
- Knowledge sharing across DNOs: As discussed in other sections in this report, sharing best practices and innovations can help to drive broader adoption of good practice.